User Manual for

EtherCAT® Slave Modules

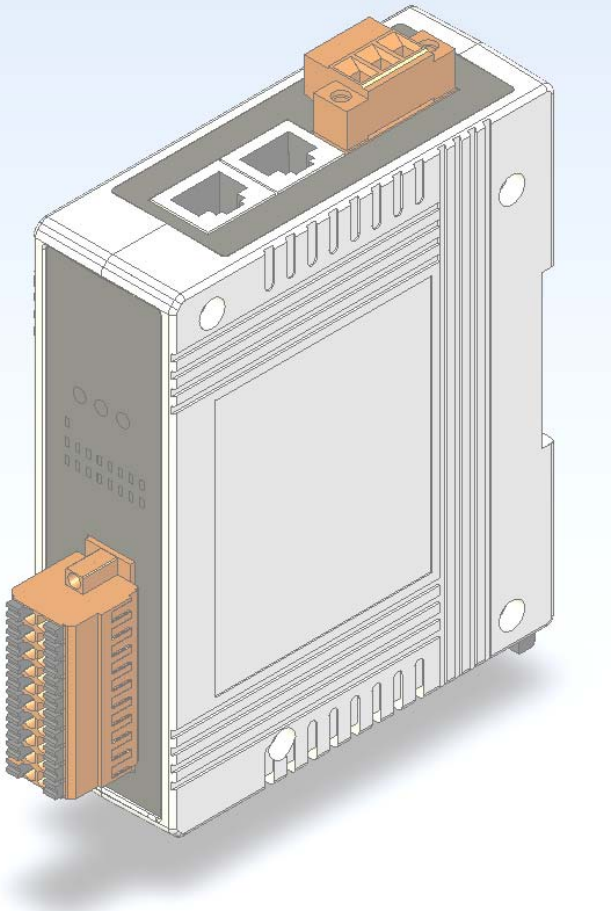
ECAT-2000 with Digital Inputs and Outputs

ECAT-2045

ECAT-2051

ECAT-2055

ECAT-2060



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LEGEL NOTICE

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All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year, beginning from the date of delivery to the original purchaser.

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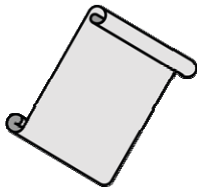
Technology Support

If you have any question for our products, please contact us directly or email service@icpdas.com

Shipping Items

The shipping package includes the following items:

ECAT-2000



Quick Start

CD

NOTICE

If any of these items is missing or damaged, please contact your local distributor for more information. Keep the shipping materials and overall package in case you want to ship the module back in the future.

More Information

- Manual:

  CD: \fieldbus_cd\ethercat\slave\ecat-2000\manual

  http://ftp.icpdas.com/pub/cd/fieldbus_cd/ethercat/slave/ecat-2000/manual/

- ENI:

  CD: \fieldbus_cd\ethercat\slave\ecat-2000\software

  http://ftp.icpdas.com/pub/cd/fieldbus_cd/ethercat/slave/ecat-2000/software/

- FAQ:

  http://www.icpdas.com/root/support/faq/faq.html

Table of Contents

1 Introduction 1

2 Hardware Information 2

2.1 ECAT-2000 General Technical Data 2

2.1.1 EtherCAT Interface 3
2.1.2 Power and F.G. Connector 3
2.1.3 Power LED 3
2.1.4 Status LEDs 3
2.1.5 I/O Status LEDs 3
2.1.6 Dimensions 4

2.2 ECAT-2045 5

2.2.1 Specifications 5
2.2.2 I/O Connector (Pin Assignment) 6
2.2.3 I/O Status LEDs 7
2.2.4 Wire Connection 7

2.3 ECAT-2051 8

2.3.1 Specifications 8
2.3.2 I/O Connector (Pin Assignment) 9
2.3.3 I/O Status LEDs 10
2.3.4 Wire Connection 10

2.4 ECAT-2055 11

2.4.1 Specifications 11
2.4.2 I/O Connector (Pin Assignment) 12
2.4.3 I/O Status LEDs 13
2.4.4 Wire Connection 13

2.5 ECAT-2060 14

2.5.1 Specifications 14
2.5.2 I/O Connector (Pin Assignment) 15
2.5.3 I/O Status LEDs 16
2.5.4 Wire Connection 16

3 Software Communications 17

3.1 Startup 17
3.2 Configuration 17

A Glossary 22

A.1 Ordering Information 22
A.2 Technical Support 22

1 Introduction

The ECAT-2000 series are industrial EtherCAT slave remote I/O modules and equipped with the EtherCAT protocol and installed by daisy chain connection which permits the flexibility in devices installation and reduces infrastructure and operation costs. All the modules can be deployed in the network topologies such as star, line or ring. The isolated input and output design protects the ECAT-2000 against the harmful interference and environment.

The ECAT-2000 has passed and verified by the conformance test tool, therefore eligible EtherCAT Master or configurator can manipulate it simply and implement your various applications easily. Fig 1.1 is shown a typical EtherCAT application.

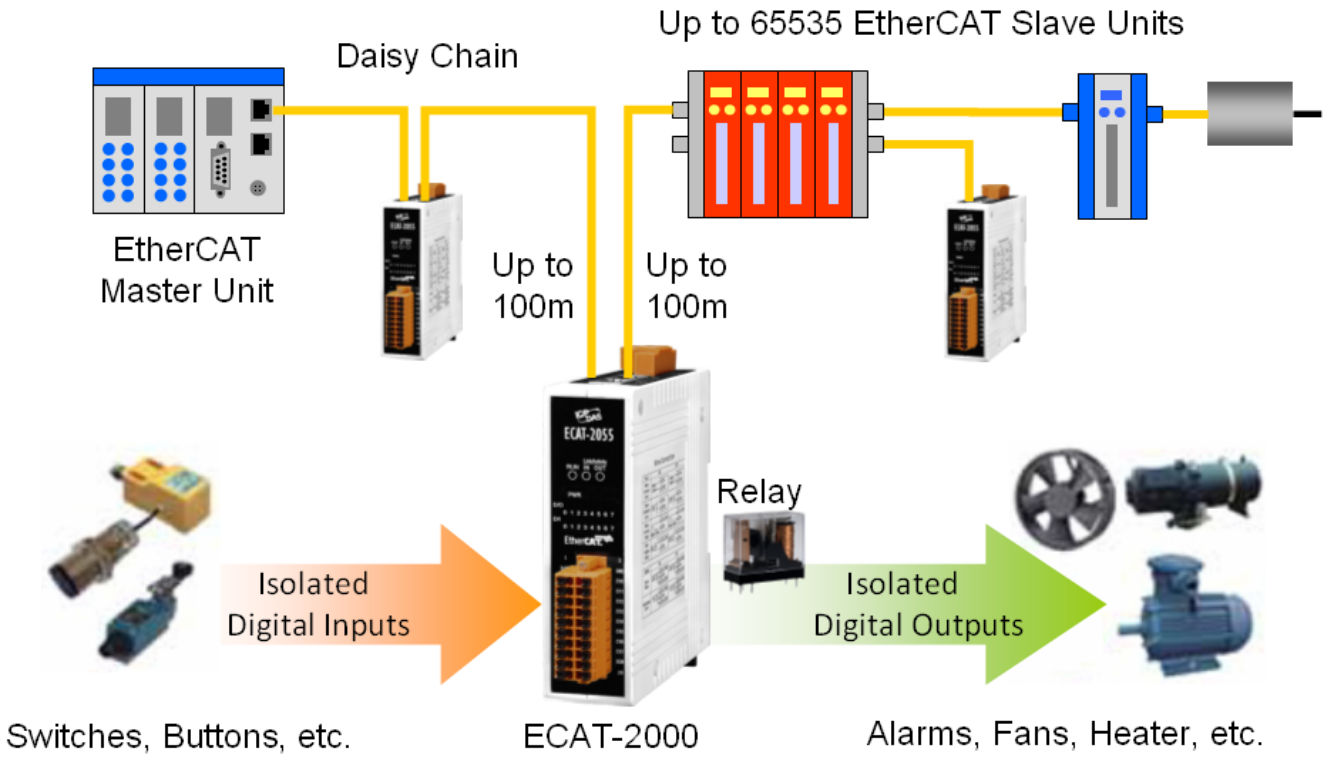


Figure 1.1 Typical Application of ECAT-2000

2 Hardware Information

2.1 ECAT-2000 General Technical Data

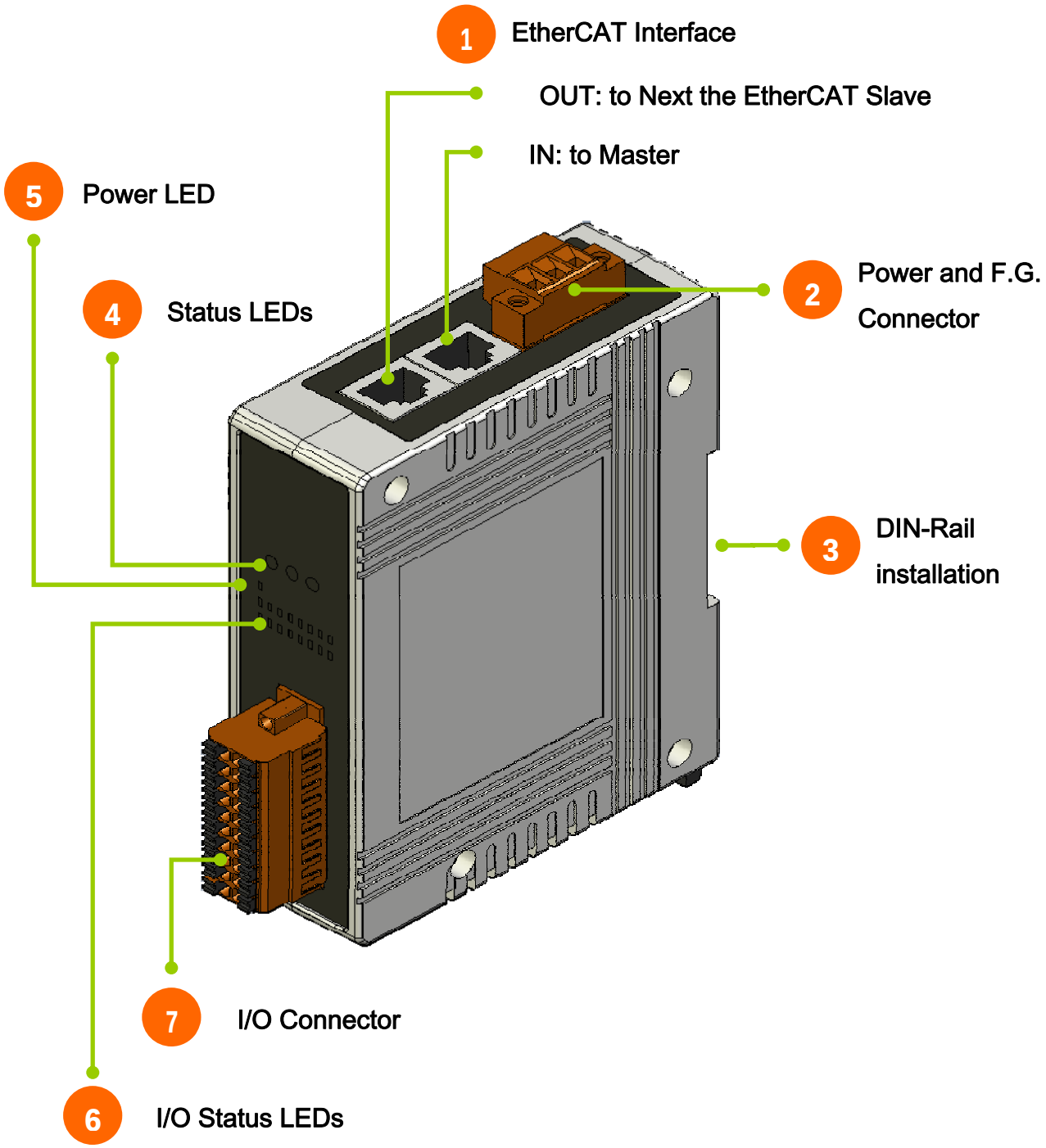


Figure 2.1 Appearance of ECAT-2000

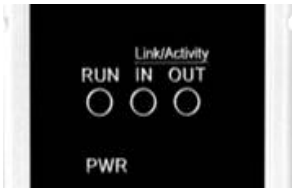
2.1.1 EtherCAT Interface

Notation	Description
IN	EtherCAT data processing, direction to the EtherCAT master
OUT	EtherCAT data processing, direction to the next slave device

2.1.2 Power and F.G. Connector

Notation	Description
+Vs	Power Supply with +10~+30VDC
GND	Power Supply Ground
F.G.	Frame Ground; i.e. Earth Contact

2.1.3 Power LED



Notation	Color	States	Description
PWR	Red	On	The device is powered up

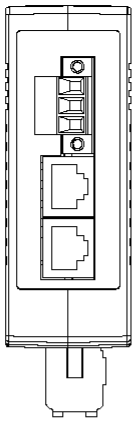
2.1.4 Status LEDs

Notation	Color	States	Description
RUN	Red	Off	The device is in state INIT
		Blinking	The device is in state PRE-OPERARIONAL
		Single Flash	The device is in state SAFE-OPERARIONAL
		On	The device is in state OPERARIONAL
Link Activity IN/OUT	Green	Off	No link
		Blinking	Link and activity
		On	Link without activity

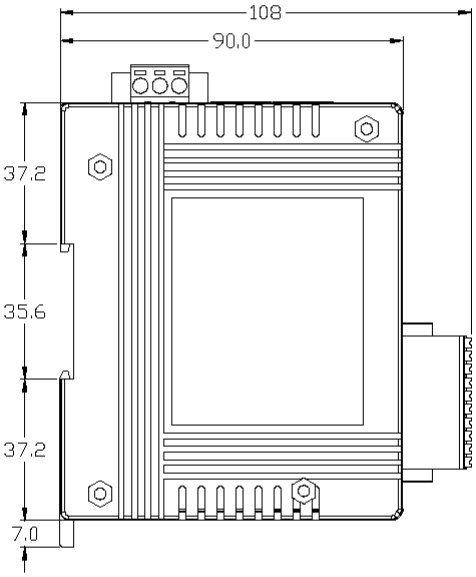
2.1.5 I/O Status LEDs

Notation	Color	States	Description
DI	Yellow	Off	Input voltage is below the lower switching threshold voltage
		On	Input voltage is higher than the upper switching threshold voltage
DO	Yellow	Off	Digital output status is “Off”
		On	Digital output status is “On”

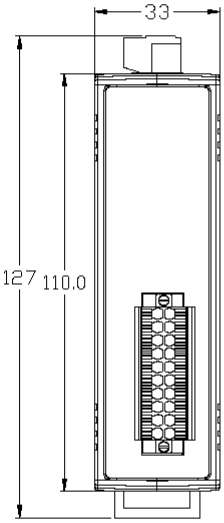
2.1.6 Dimensions



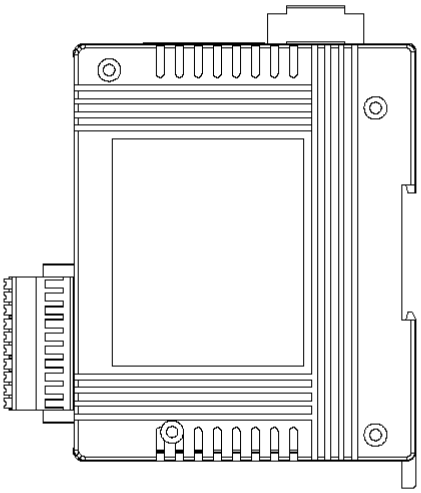
Top View



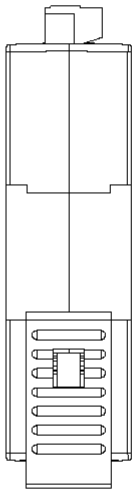
Left Side View



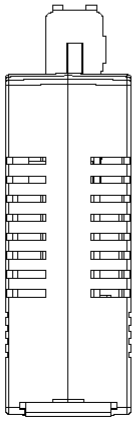
Front View



Right Side View



Rear View



Bottom View

Unit: mm

2.2 ECAT-2045

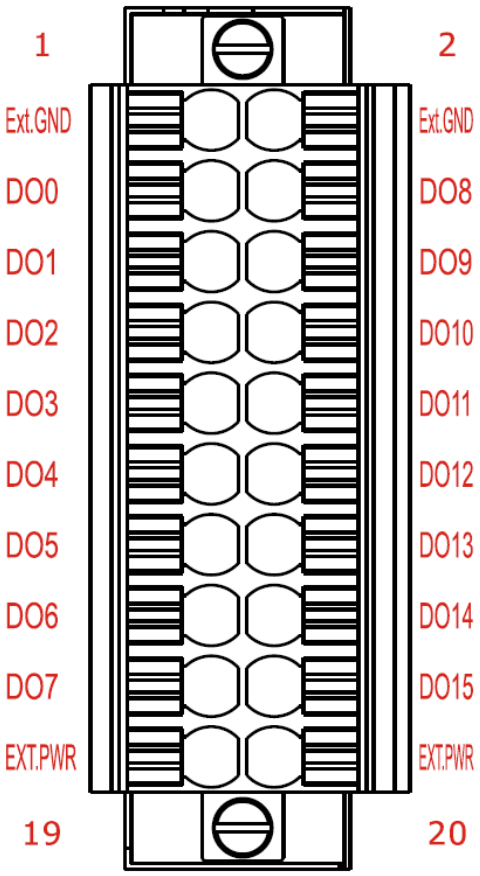
The ECAT-2045 is an industrial EtherCAT slave I/O module which is built in 16 isolated digital outputs. Users can obtain the input and output status not only via the process data but also from its LED indicators.

2.2.1 Specifications

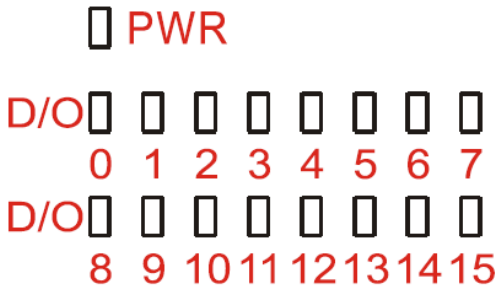
Digital Output	
Channels	16
Output Type	Open Collector (Sink)
Load Voltage	+3.5 ~ +50 V
Max. Load Current	700mA per Channel
Isolation Voltage	3750 Vrms
Power	
Input Voltage Range	10V ~ 30VDC
Power Consumption	Max. 4W
Communication Interface	
Connector	2 x RJ-45
Protocol	EtherCAT
Distance between Stations	Max. 100 m (100BASE-TX)
Data Transfer Medium	Ethernet/EtherCAT Cable (Min. CAT 5), Shielded
Mechanism	
Installation	DIN-Rail
Dimensions	110mm x 90mm x 33mm (H x W x D, without connectors)
Case Material	UL 94V-0 Level

Environment	
Operating Temperature	-25°C ~ 75°C
Storage Temperature	-30°C ~ 80°C
Relative Humidity	10 ~ 90%, No Condensation
ESD (IEC 61000-4-2)	4 KV Contact for Each Channel
EFT (IEC 61000-4-4)	Power: 1 KV Class A; Signal: 1 KV Class A
Surge (IEC 61000-4-5)	1 KV Class A
Hi-Pot	1KV Class A

2.2.2 I/O Connector (Pin Assignment)

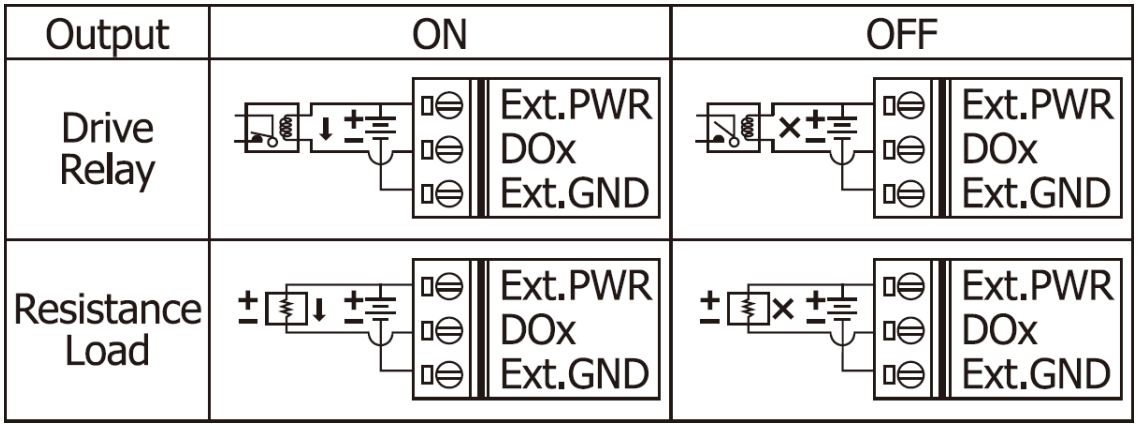


2.2.3 I/O Status LEDs



Notation	Color	States	Description
DO	Yellow	Off	Digital output status is “Off”
		On	Digital output status is “On”

2.2.4 Wire Connection



2.3 ECAT-2051

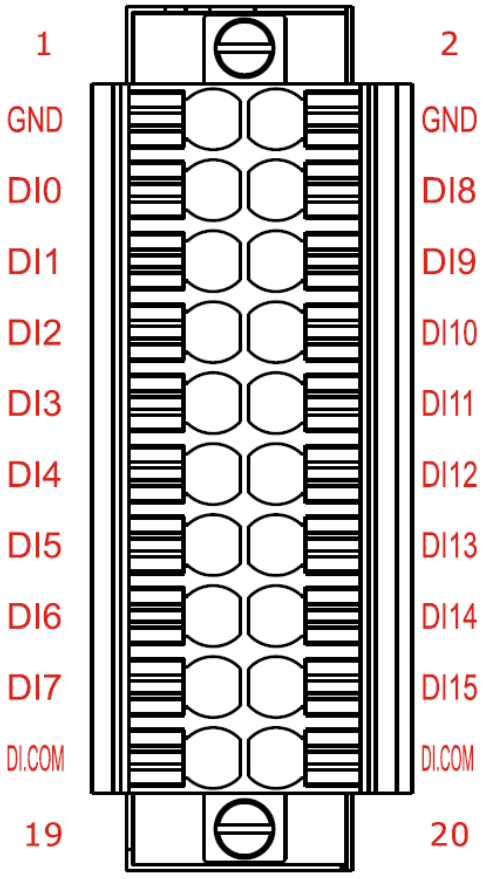
The ECAT-2051 is an industrial EtherCAT slave I/O module which is built in 16 isolated digital inputs. Users can obtain the input and output status not only via the process data but also from its LED indicators.

2.3.1 Specifications

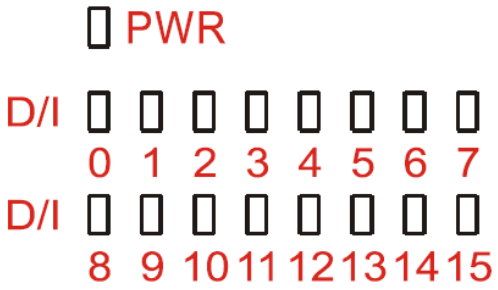
Digital Input		
Channels	16	
Input Type	Dry (Source)	Wet (Sink/Source)
Off Voltage Level	Open	+4V Max.
On Voltage Level	Close to GND	+10 V ~ +50 V
Isolation Voltage	3750 VDC	
Power		
Input Voltage Range	10V ~ 30VDC	
Power Consumption	Max. 4W	
Communication Interface		
Connector	2 x RJ-45	
Protocol	EtherCAT	
Distance between Stations	Max. 100 m (100BASE-TX)	
Data Transfer Medium	Ethernet/EtherCAT Cable (Min. CAT 5), Shielded	
Mechanism		
Installation	DIN-Rail	
Dimensions	110mm x 90mm x 33mm (H x W x D, without connectors)	
Case Material	UL 94V-0 Level	

Environment	
Operating Temperature	-25°C ~ 75°C
Storage Temperature	-30°C ~ 80°C
Relative Humidity	10 ~ 90%, No Condensation
ESD (IEC 61000-4-2)	4 KV Contact for Each Channel
EFT (IEC 61000-4-4)	Power: 1 KV Class A; Signal: 1 KV Class A
Surge (IEC 61000-4-5)	1 KV Class A
Hi-Pot	1KV Class A

2.3.2 I/O Connector (Pin Assignment)

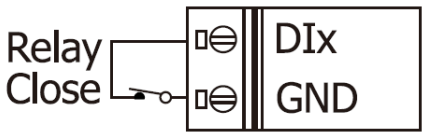
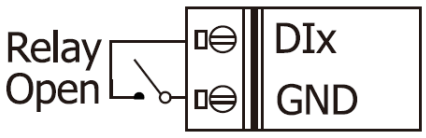
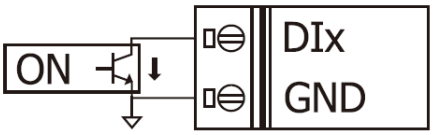
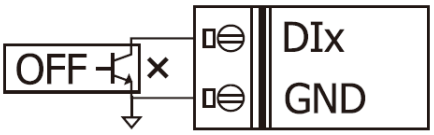
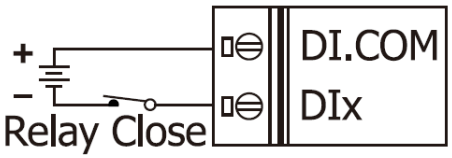
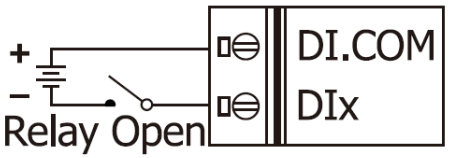
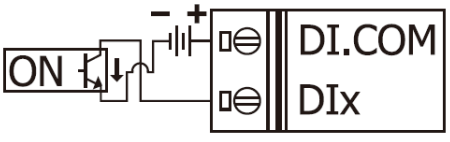
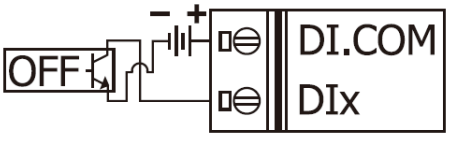


2.3.3 I/O Status LEDs



Notation	Color	States	Description
DI	Yellow	Off	Input voltage is lower than +4VDC(Max.)
		On	Input voltage is higher than “Off” state

2.3.4 Wire Connection

Input	ON	OFF
Relay Contact (Dry)		
Open Collector (Dry)		
Relay Contact (Wet)		
NPN Output (Wet)		

2.4 ECAT-2055

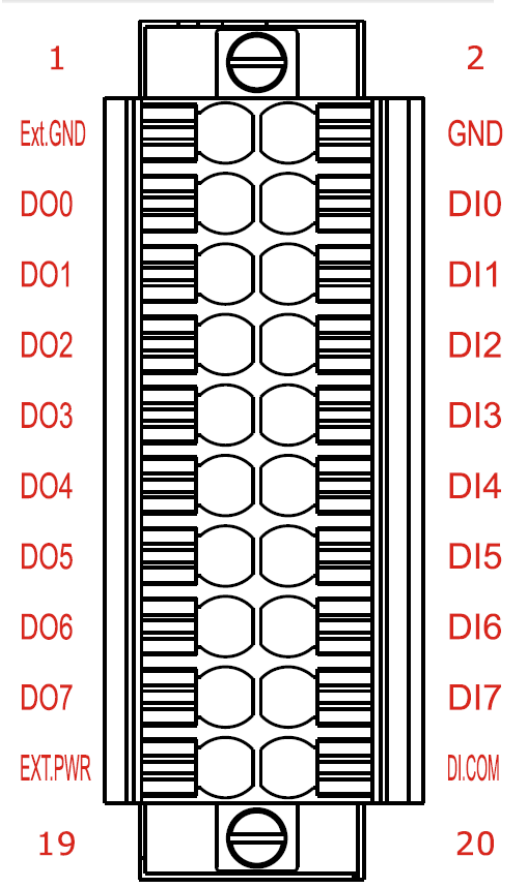
The ECAT-2055 is an industrial slave I/O module built in 8 isolated digital inputs and 8 isolated digital outputs. Users can obtain the input and output status not only via the process data but also from its LED indicators.

2.4.1 Specifications

Digital Input		
Channels	8	
Input Type	Dry (Source)	Wet (Sink/Source)
Off Voltage Level	Open	+4V Max.
On Voltage Level	Close to GND	+10 V ~ +50 V
Isolation Voltage	3750 VDC	
Digital Output		
Channels	8	
Output Type	Open Collector (Sink)	
Load Voltage	+3.5 ~ +50 V	
Max. Load Current	700mA per Channel	
Isolation Voltage	3750 Vrms	
Communication Interface		
Connector	2 x RJ-45	
Protocol	EtherCAT	
Distance between Stations	Max. 100 m (100BASE-TX)	
Data Transfer Medium	Ethernet/EtherCAT Cable (Min. CAT 5), Shielded	

Power	
Input Voltage Range	10V ~ 30VDC
Power Consumption	Max. 4W
Mechanism	
Installation	DIN-Rail
Dimensions	110mm x 90mm x 33mm (H x W x D, without connectors)
Case Material	UL 94V-0 Level
Environment	
Operating Temperature	-25°C ~ 75°C
Storage Temperature	-30°C ~ 80°C
Relative Humidity	10 ~ 90%, No Condensation
ESD (IEC 61000-4-2)	4 KV Contact for Each Channel
EFT (IEC 61000-4-4)	Power: 1 KV Class A; Signal: 1 KV Class A
Surge (IEC 61000-4-5)	1 KV Class A
Hi-Pot	1KV Class A

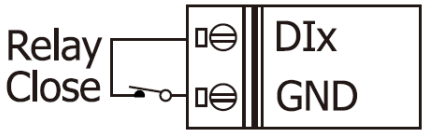
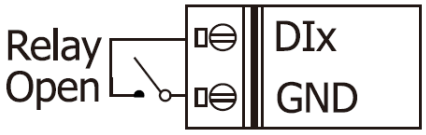
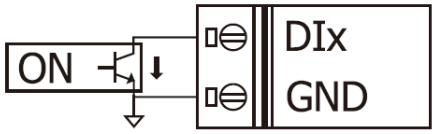
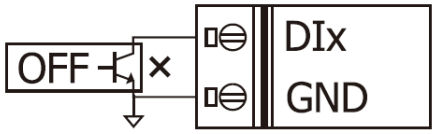
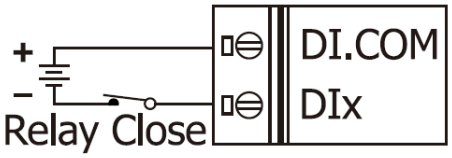
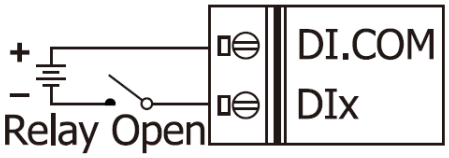
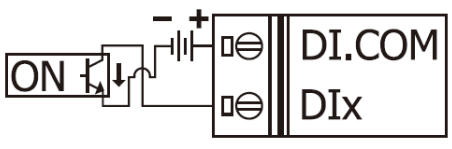
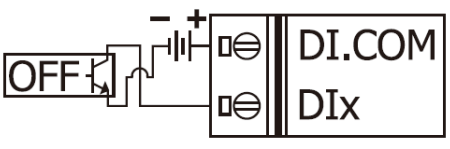
2.4.2 I/O Connector (Pin Assignment)

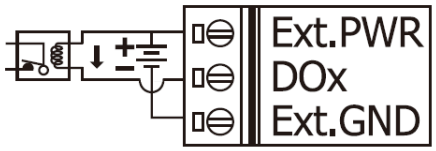
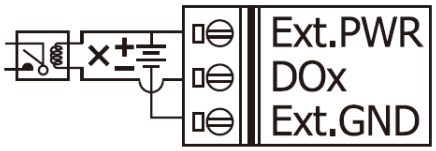
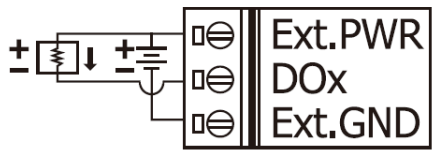
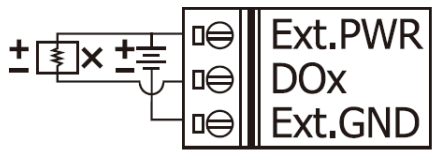


2.4.3 I/O Status LEDs

Notation	Color	States	Description
DI	Yellow	Off	Input voltage is lower than +4VDC(Max.)
		On	Input voltage is higher than “Off” state
DO	Yellow	Off	Digital output status is “Off”
		On	Digital output status is “On”

2.4.4 Wire Connection

Input	ON	OFF
Relay Contact (Dry)		
Open Collector (Dry)		
Relay Contact (Wet)		
NPN Output (Wet)		

Output	ON	OFF
Drive Relay		
Resistance Load		

2.5 ECAT-2060

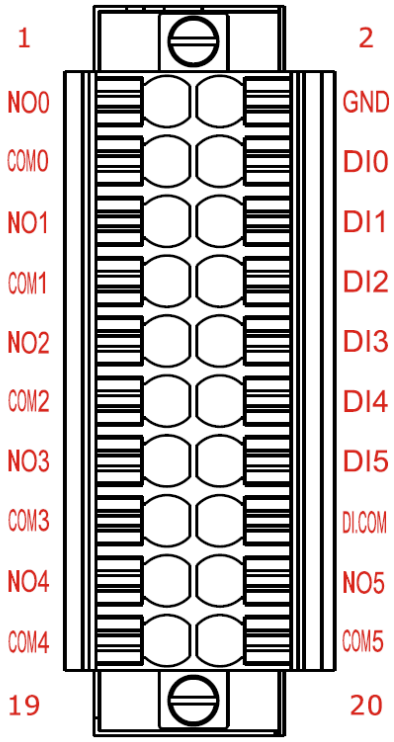
The ECAT-2060 is an industrial slave I/O module built in 6 isolated digital inputs and 6 isolated relay outputs. Users can obtain the input and output status not only via the process data but also from its LED indicators.

2.5.1 Specifications

Digital Input		
Channels	6	
Input Type	Dry (Source)	Wet (Sink/Source)
Off Voltage Level	Open	+4V Max.
On Voltage Level	Close to GND	+10 V ~ +50 V
Isolation Voltage	3750 VDC	
Digital Output		
Channels	6	
Output Type	Form A (SPST-NO)	
Contact Rating (Resistive Load)	5A@30VDC; 5A@125/250VAC(47~63Hz)	
Operate Time	10 ms Max.	
Release Time	5 ms Max.	
Mechanical Endurance	2 x 10^7 Ops.	
Electrical Endurance	10^5 Ops.	
Power		
Input Voltage Range	10V ~ 30VDC	
Power Consumption	Max. 4W	

Communication Interface	
Connector	2 x RJ-45
Protocol	EtherCAT
Distance between Stations	Max. 100 m (100BASE-TX)
Data Transfer Medium	Ethernet/EtherCAT Cable (Min. CAT 5), Shielded
Mechanism	
Installation	DIN-Rail
Dimensions	110mm x 90mm x 33mm (H x W x D, without connectors)
Case Material	UL 94V-0 Level
Environment	
Operating Temperature	-25°C ~ 75°C
Storage Temperature	-30°C ~ 80°C
Relative Humidity	10 ~ 90%, No Condensation
ESD (IEC 61000-4-2)	4 KV Contact for Each Channel
EFT (IEC 61000-4-4)	Power: 1 KV Class A; Signal: 1 KV Class A
Surge (IEC 61000-4-5)	1 KV Class A
Hi-Pot	1KV Class A

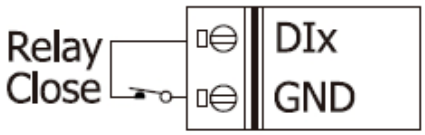
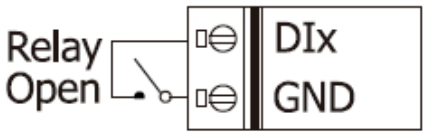
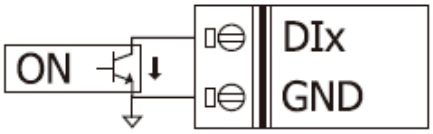
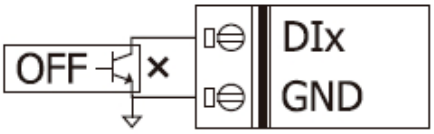
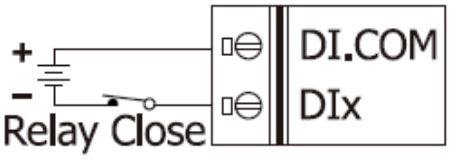
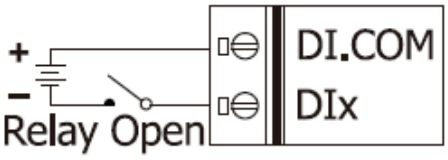
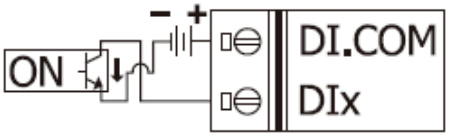
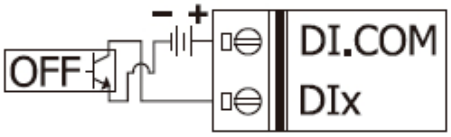
2.5.2 I/O Connector (Pin Assignment)

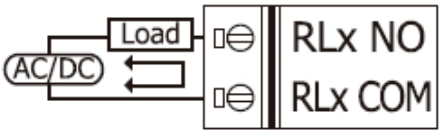
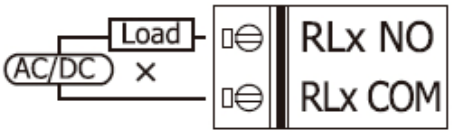


2.5.3 I/O Status LEDs

Notation	Color	States	Description
DI	Yellow	Off	Input voltage is lower than +4VDC(Max.)
		On	Input voltage is higher than “Off” state
DO	Yellow	Off	Digital output status is “Off”
		On	Digital output status is “On”

2.5.4 Wire Connection

Input	ON	OFF
Relay Contact (Dry)		
Open Collector (Dry)		
Relay Contact (Wet)		
NPN Output (Wet)		

Output	ON	OFF
Relay		

3 Software Communications

3.1 Startup

EtherCAT devices are described in an XML file, ESI (EtherCAT Slave Information) file, which describes the modules of the ECAT-2000 series named "***ICPDAS ECAT-2000.xml***."

1. Download the ESI file, ***ICPDAS ECAT-2000.xml***, from the website
   http://ftp.icpdas.com/pub/cd/fieldbus_cd/ethercat/slave/ecat-2000/software/
   or from the CD in the shipping package
   CD: \fieldbus_cd\ethercat\slave\ecat-2000\software

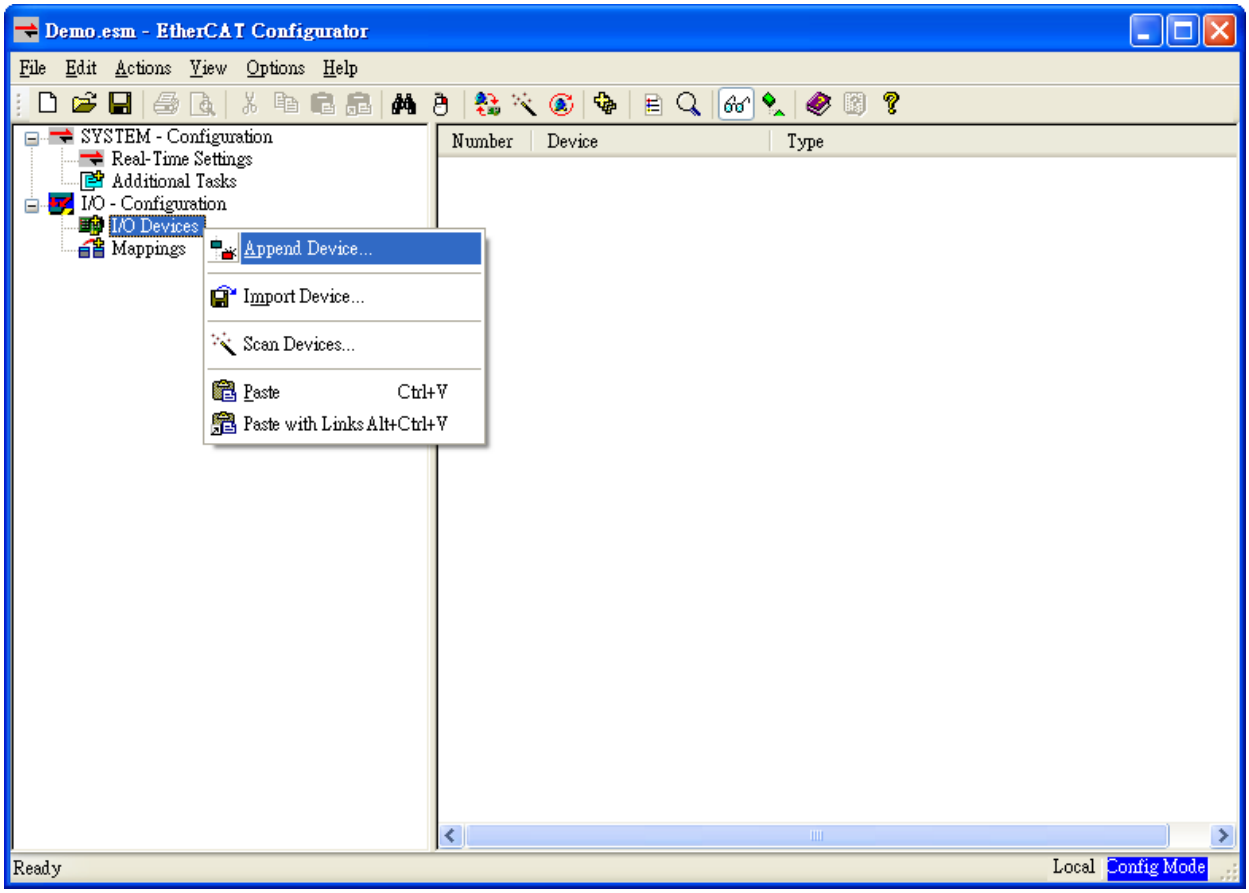
2. Copy the file "***ICPDAS ECAT-2000.xml***" to the destination folder of EtherCAT Master Tools(***Beckhoff EtherCAT Configurator*** or ***TwinCAT*** etc.)
   C:\EtherCAT Configurator\EtherCAT\ICPDAS ECAT-2000.xml
   C:\TwinCAT\Io\EtherCAT\ICPDAS ECAT-2000.xml
   Otherwise, if you are using another tool, to the folder set for that tool.

3.2 Configuration

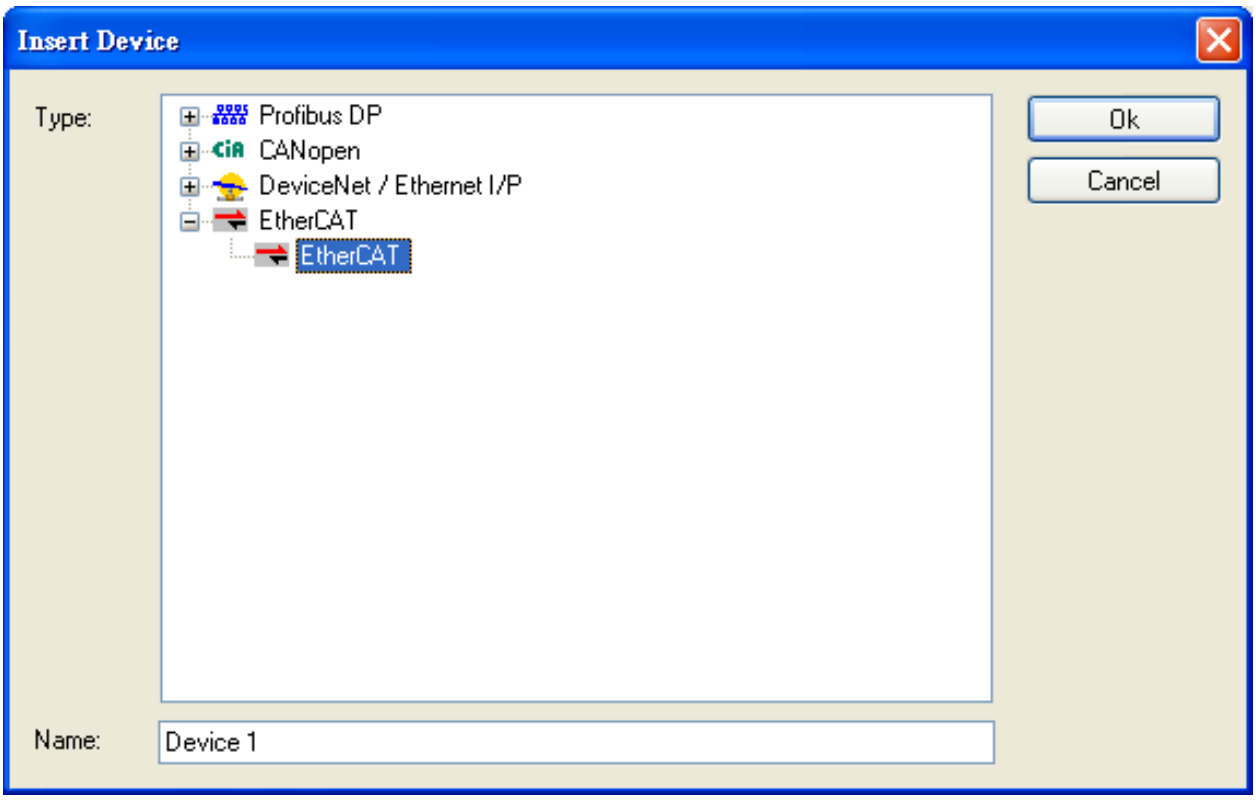
This section is described the configuration using the example of ECAT-2055 and the ***EtherCAT Configurator*** supplied by Beckhoff. Otherwise, if another tool is used, choose a configuration method as applicable.

1. Start your ***EtherCAT Configurator***.
2. Choose File, New to create a new I/O Configuration.

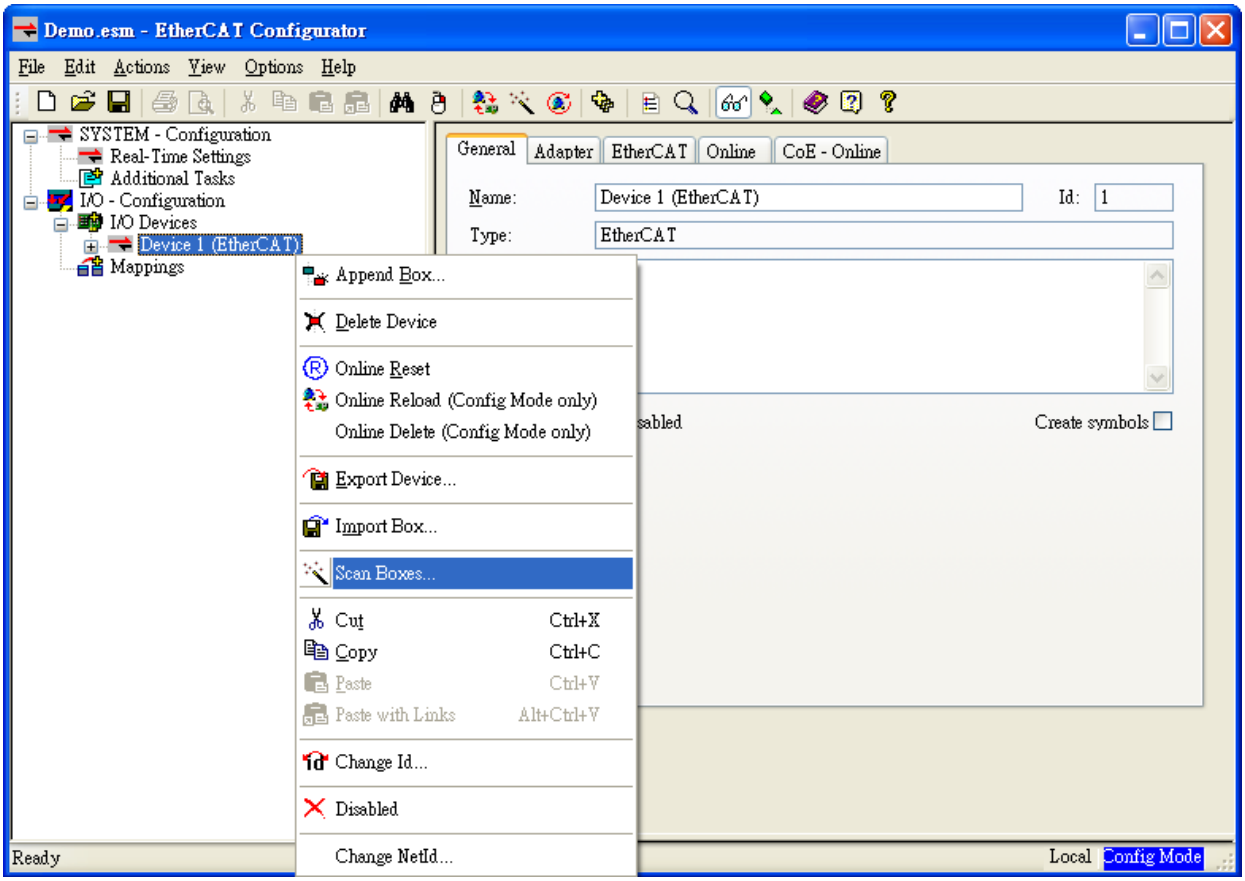
3. Click ***I/O Device*** with the right mouse button and choose ***Append Device...*** in the menu, and then the dialog window Insert Device is opened.



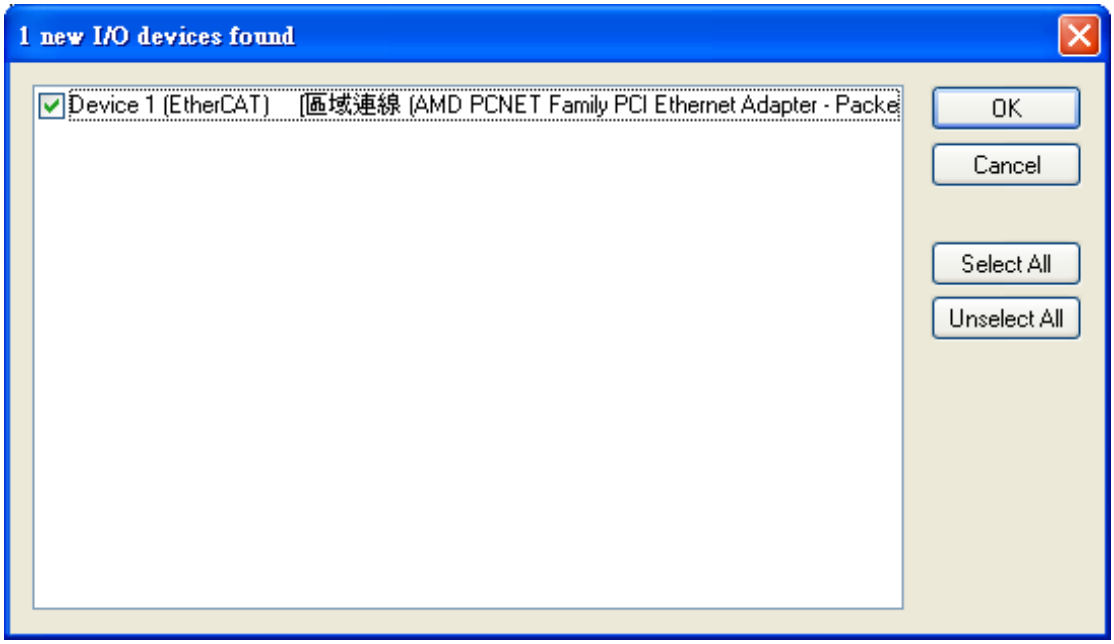
4. Select the ***EtherCAT*** type in this dialog window and confirm with ***OK***.



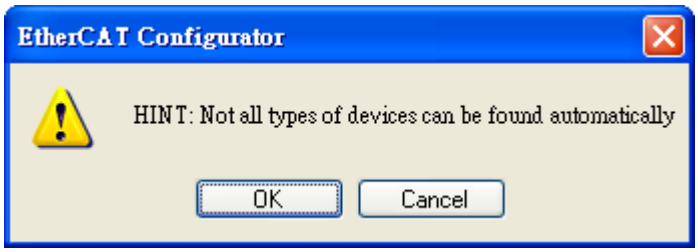
5. ***Device 1 (EtherCAT)*** is added to to your configuration, i.e. a new EtherCAT line. Click ***Device 1(EtherCAT)*** with the right mouse button and choose ***Scan Boxes...*** in the menu.



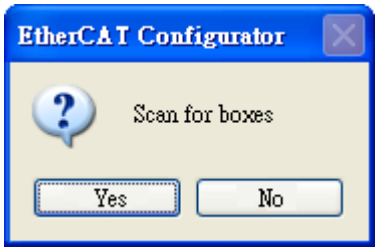
6. Choose the correct network device which is connected to ECAT-2000.



7. If the hint is shown, click ***Yes/OK*** and continue.

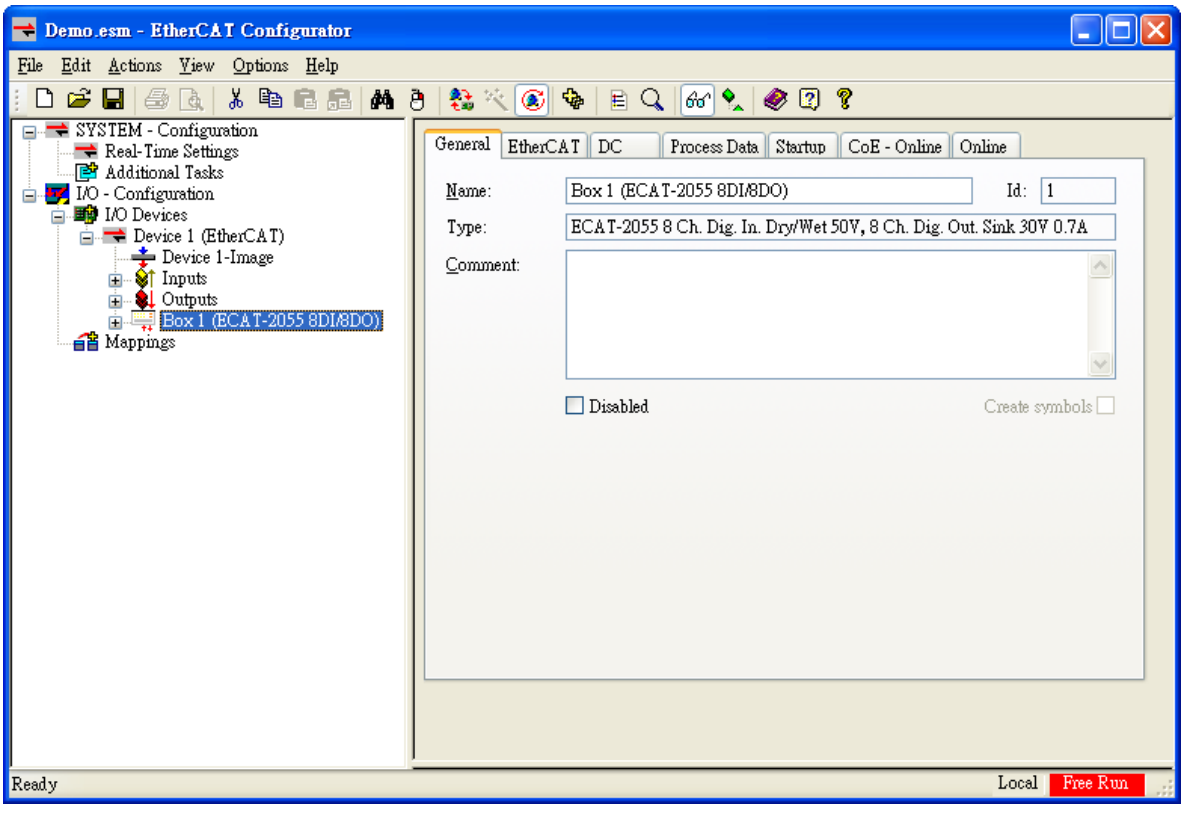


8. Click ***Yes*** to start scanning for ECAT-2000.

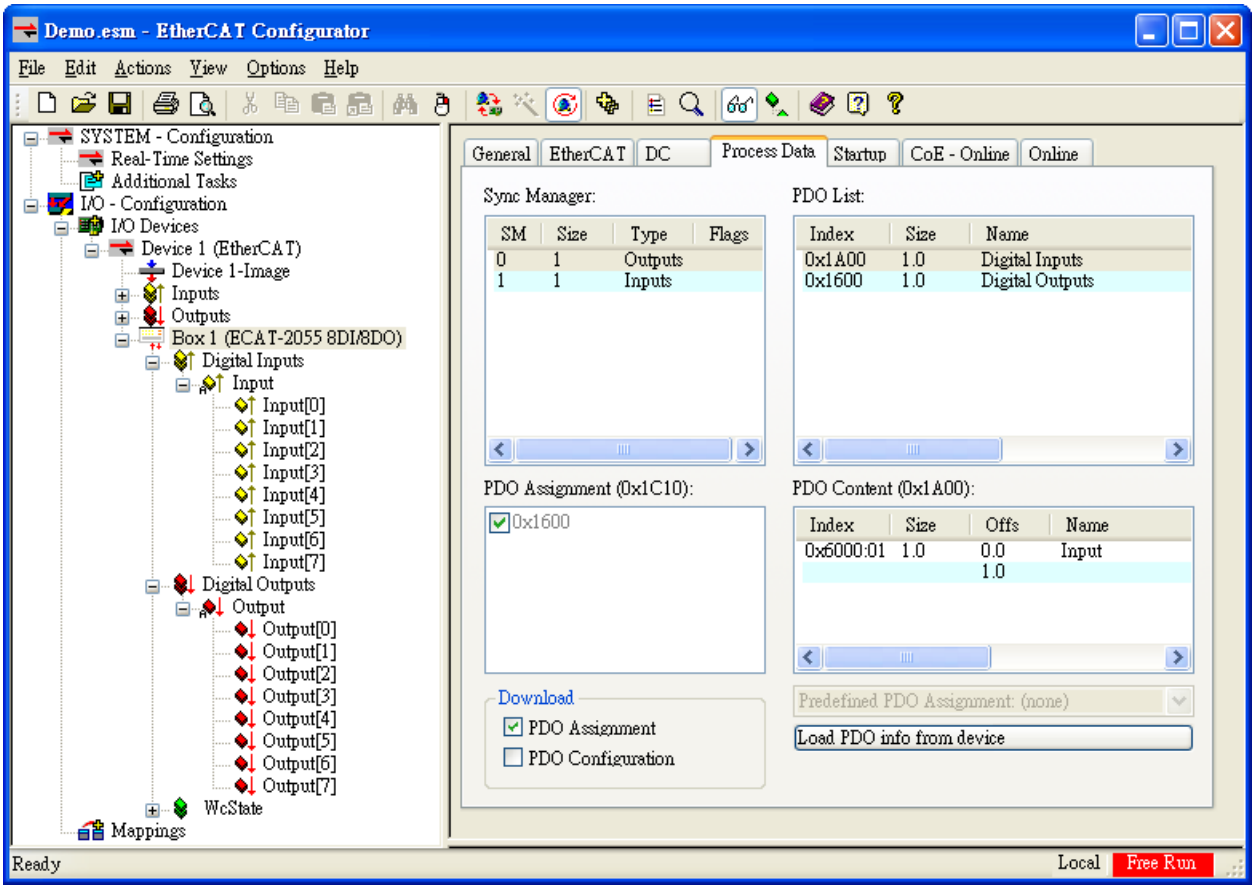


9. Click ***Yes*** to activate the free run mode for EtherCAT Configurator.

10. The ***ECAT-2000 (Box 1)*** is now shown in the EtherCAT Configurator.



11. The input and output variables contained in the ESI (*.xml) file of the ECAT-2000 are displayed as CANopen Process Data Objects(PDO). The PDOs are listed in the ***PDO List*** of the ***Process Data*** tab.



A Glossary

A.1 Ordering Information

EtherCAT Slave DIO Modules	
ECAT-2045CR	EtherCAT Slave I/O Module with Isolated 16-ch DO (RoHS)
ECAT-2051 CR	EtherCAT Slave I/O Module with Isolated 16-ch DI (RoHS)
ECAT-2055 CR	EtherCAT Slave I/O Module with Isolated 8-ch DO and 8-ch DI (RoHS)

A.2 Technical Support

If you have any difficulties using your ECAT-2000 series modules, please contact us or send a description for the problem to service@icpdas.com.